

## 5.6 Ion migration

When a voltage is applied to an electrolyte the ions **migrate**. The cations migrate to the cathode and the anions migrate to the anode. This migration of ions carries the electric current through the electrolyte.

### Aim

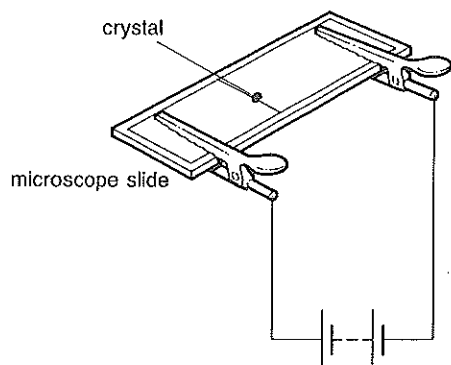
To observe the migration of ions in coloured compounds.

### Apparatus and materials

2 microscope slides  
4 lengths of connecting wire  
Lab pack or low voltage source set to 20 V d.c.  
Chromatography paper  
Scissors  
Crystals of:  
potassium manganate(VII)  
potassium chromate(VI)  
copper(II) sulphate  
copper(II) chromate(VI)  
Tap water  
Forceps

### Procedure

- 1 Cut a piece of chromatography paper to fit a microscope slide.
- 2 Draw a thin pencil line across the middle of the paper as shown.



- 3 Dampen the paper with tap water and secure it to the microscope slide with a pair of crocodile clips connected to a 20 V d.c. supply.
- 4 Place a crystal of potassium manganate(VII) on the centre of the pencil line using forceps and switch on the electricity.
- 5 Leave the potassium manganate(VII) to migrate under the influence of the current for at least 10 minutes.

- 6 Disconnect the current and sketch the appearance of the potassium manganate(VII).
- 7 Repeat steps 1–6 with the other compounds. Two experiments can be set up from one lab pack if the slides are arranged in parallel.

### Results

Copy and complete the following tables:

compound	formula	colour	sketch of result
potassium manganate(VII)			
potassium chromate(VI)			
copper(II) sulphate			
copper(II) chromate(VI)			

compound	colour of anion	colour of cation
potassium manganate(VII)		
potassium chromate(VI)		
copper(II) sulphate		
copper(II) chromate(VI)		

### Questions

- 1 a) Describe the shape of the potassium manganate(VII) stain after the ions have migrated.  
b) Name the two colourless ions in the four compounds used in the experiment.  
c) Why is tap water used and not distilled water?  
d) What would have happened if several crystals had been used in each part of the experiment instead of one?  
e) What shape would you expect if the potassium manganate(VII) were allowed to spread by diffusion and not ion migration?
- 2 The migration of ions can be demonstrated using dilute potassium manganate(VII) solution, a U-tube, carbon electrodes, a 20 V electrical supply and connecting leads. Using a diagram explain how you would carry out this experiment.